

This instant patent application claims priority to PCT Patent

- 5 Application No. PCT/US2004/033173 filed 08 Oct 2004 and US Provisional  
Patent Application No. 60/510,253 filed 10 Oct 2003, which are herein  
incorporated by reference in their entirety.

## BACKGROUND OF THE INVENTION

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### 1. Field of the invention

- The invention relates to a package for dispensing and delivering  
product. The invention further relates to a child-resistant package. The  
invention still further relates to a closure for a child-resistant package. The  
15 invention still yet further relates to a container for a child-resistant package.

### 2. Description of the Prior Art

- Child-resistant packages have been developed for use in dispensing  
products deemed potentially harmful to children if imbibed or otherwise  
20 exposed. Such packages typically comprise a container and a closure. The  
closure typically requires mechanical manipulation to unscrew or decouple is  
from the container. Some common types include push-and-turn and  
squeeze-and-turn. Such packages have commonly been employed with  
tubular plastic dispensing containers.

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- Some squeeze-and-turn tubular plastic dispensing containers have  
employed locking lugs on the base or shoulder of a container to engage  
portions of a closure. Examples of such packages are shown in Great Britain  
Patent Application 2,030,970 A1 and U.S. Patent Nos. 4,335,823; 4,413,743;  
30 5,145,080; 5,988,412; 5,915,576; 6,112,921 and 6,357,615 B1.

- Squeeze-and-turn tubular plastic dispensing containers have  
heretofore been unavailable in small diameter sizes, i.e., 0.50 to 0.75 inch in  
base or shoulder diameter. Containers of small diameter are difficult to  
35 design because of the relatively small circumference available to achieve  
mating between lugs and the closure.

It would be desirable to have a child-resistant package of small diameter size. It would further be desirable to have a child-resistant package of the squeeze-and-turn type. It would further be desirable to have a child-resistant package employing locking lugs.

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## SUMMARY OF THE INVENTION

According to the present invention, there is a dispensing tube package. The package has a dispensing container and a closure  
10 engageable and lockable with the dispensing container. The container has a body wall and a head. The head has a neck and a shoulder. The body wall defines a chamber therein. The neck communicates with the body wall via the shoulder. The neck has an orifice therein and a passageway  
15 therethrough extending from the orifice to the chamber. One or more lugs extend from the shoulder adjacent the periphery of the shoulder. The neck has a first thread extending therefrom. The first thread has a pitch of about 0.08 to about 0.16 inch and an initial full thread generally in alignment with the lug directional with the longitudinal extension of the neck. The closure  
20 has a top end having a generally circumferential outer skirt extending therefrom and a generally circumferential inner skirt extending therefrom. The inner skirt is situated inside the outer skirt. The inner skirt has a second thread extending therefrom at an inner surface. The second thread is rotatably engageable with the first thread of the neck. The outer skirt terminates at a first edge opposite the top end. The inner skirt terminates  
25 at a second edge opposite the top end. The outer skirt has a slot therein extending inward from the edge. The slot therein is adapted to receive a portion of the lug therein when the closure is in locking position with the head.

30 Further according to the present invention, there is a dispensing container. The dispensing container has a body wall and a head. The head has a neck and a shoulder. The body wall defines a chamber therein. The neck communicates with the body wall via the shoulder. The neck has an orifice therein and a passageway there through extending from the

orifice to the chamber. One or more lugs extend from the shoulder adjacent the periphery of the shoulder. The neck has a first thread extending therefrom. The first thread has a pitch of about 0.08 to about 0.16 inch and an initial full thread generally in alignment with the lug  
5 directional with the longitudinal extension of the neck.

Further according to the present invention, there is a closure. The closure has a top end having a generally circumferential outer skirt extending therefrom and a generally circumferential inner skirt extending  
10 therefrom. The inner skirt is situated inside the outer skirt. The inner skirt has a second thread extending therefrom at an inner surface. The second thread is rotatably engageable with the first thread of the neck. The outer skirt terminates at a first edge opposite the top end. The inner skirt terminates at a second edge opposite the top end. The outer skirt has a  
15 slot therein extending inward from the edge. The slot defines a flat surface adjacent thereto. The flat surface is generally directional with the longitudinal extension of the outer skirt. The slot extends angularly from the edge therein to the flat surface.

20 Further according to the invention, there is a dispensing packaging. The package has a dispensing container and a closure. The container has a body wall and a head. The head has a neck and a shoulder. The body wall defines a chamber therein. The neck communicates with the body wall via the shoulder. The neck has an orifice therein and a passageway  
25 therethrough extending from the orifice to the chamber. There are two or more lugs extending from the shoulder adjacent the periphery of the shoulder. The neck has two or more intertwining threads extending therefrom and therealong. The threads have a pitch of about 0.15 to about 0.30 inch. Each of the two or more threads have an initial full thread  
30 generally in alignment with a lug directional with the longitudinal extension of the neck. The closure is engageable and lockable with the dispensing container. The closure has a top end having a generally circumferential outer skirt extending therefrom and a generally circumferential inner skirt extending therefrom. The inner skirt is situated inside the outer skirt. The

inner skirt has two or more intertwining threads extending therefrom and therealong at an inner surface. The two or more intertwining threads are rotatably engageable with the two or more intertwining threads of the neck. The outer skirt terminates at a first edge opposite the top end. The inner  
5 skirt terminates at a second edge opposite the top end. The outer skirt has a slot therein extending inward from the edge. The slot therein is adapted to receive a portion of the two or more lugs therein when the closure is in locking position with the head.

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#### BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a perspective view of an embodiment of a dispensing package according to the present invention.

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Figure 2 is a perspective view of an embodiment of a closure according to the present invention.

Figure 3 is a cross-sectional view of the closure of Figure 2 along  
20 the line 3-3.

Figure 4 is a side view of the closure of Figure 2.

Figure 5 is a perspective partial view of an embodiment of a  
25 dispensing container according to the present invention.

Figure 6 is a top view of the dispensing container of Figure 5.

Figure 7 is a side view of the dispensing container of Figure 5.

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Figure 8 is a cross-section view of the package of Figure 1 along line  
8-8.

Figure 9 is a closeup view of the threads of the closure of Figure 3.

Figure 10 is a perspective view of another embodiment of a closure of the present invention.

5           Figure 11 is a cross-sectional view of the closure of Figure 10 along the line 11-11.

Figure 12 is a perspective view of still another embodiment of a dispensing container according to the present invention.

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Figure 13 is a partial side view of the dispensing container of Figure 12.

15           Figure 14 is another partial side view of the dispensing container of Figure 12.

Figure 15 is a top view of the dispensing container of Figure 12.

20           Figure 16 is a cross-sectional view of a package formed when the closure of Figure 2 is engaged with the dispensing container of Figure 12 in the same manner as in Figure 1. The cross-section is viewed from the same reference as line 8-8 in Figure 1.

25           Figure 17 is a perspective view of yet another embodiment of a dispensing container according to the present invention.

Figure 18 is a partial side view of the dispensing container of Figure 17.

30           Figure 19 is a partial side view of the dispensing container of Figure 17.

Figure 20 is top view of the dispensing container of Figure 17.

Figure 21 is a fragmentary, perspective view of still yet another embodiment of a dispensing container according to the present invention.

Figure 22 is a fragmentary, side view of the dispensing container of  
5 Figure 21.

Figure 23 is a fragmentary, perspective view of the dispensing container of Figure 21 joined with a closure to form a package.

10 Figure 24 is a fragmentary, side view of the dispensing container of Figure 21 joined with a closure to form a package.

Figure 25 is a side view of a closure according to the present invention.

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#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The following are preferred aspects and features of the present invention.

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A preferred slot in the closure can be substantially the same shape as the portion of the lug to be received therein. The slot defines a vertical edge adjacent thereto, and the vertical edge is generally directional with respect to the longitudinal extension of the outer skirt. The slot extends  
25 angularly from the edge of the outer skirt therein to the vertical edge.

A preferred lug defines a flat surface generally directional with the longitudinal extension of the neck. The flat surface is engaged with the vertical edge when the closure is in locking position with the head. In one  
30 embodiment, the lug extends from the neck radially outward. The lug is substantially free of contact with the neck. In another embodiment, the lug has a notch therein at an outer portion thereof with the notch bearing a flat surface. In a preferred embodiment, there are two lugs extending from the shoulder with the two lugs being positioned oppositely about the neck.

Preferably, the height of the lug is about one-half of the pitch of the thread on the outer surface of the neck.

In a preferred closure, the outer surface of the outer skirt defines  
5 knurls therein extending generally from the bottom edge toward the top end of the closure. The inner surface of the outer skirt has one or more ribs extending from about the middle thereof toward the top end to mechanically strengthen the closure. Most preferably, there are three to six ribs. The  
10 shoulder has a more preferred diameter of about 0.5 to about 0.75 inch and a most preferred diameter of about 0.6 inch. The inner and outer skirts are most preferably tapered inward about 0.5° (degrees) with respect to the longitudinal extension of the closure to enhance moldability during injection molding of the closure. The closure preferably has a plug seal extending  
15 circumferentially from the top end generally directional to the longitudinal extension of the closure. The plug seal is adapted to fit within and seal the orifice when the closure is in locking position with the head. In lieu of a plug seal, the closure may have a foam layer situated at a central area of an inner surface of the top end thereof. The foam layer would be adapted to fit over and seal the orifice when the closure is in locking position with  
20 the head. The shoulder can be sloped or flat in shape. The thread on the neck preferably has a pitch of about 0.1 to about 0.12 inch and most preferably a pitch of about 0.1 inch. In addition to having an initial full thread generally in alignment with a lug directional with the longitudinal extension of the neck, a preferred dispensing container also has a terminal  
25 full thread generally in alignment same.

An embodiment of a dispensing tube package is shown in Figure 1 and is generally referenced by the numeral 10. Package 10 has a  
dispensing container 20 and a closure 12 engageable and lockable with  
30 container 20. Closure 12 is shown in isolation in Figure 2. As shown in Figure 5, container 20 has a body wall 16 and a head 22. Head 22 has a neck 24 and a shoulder 26. Body wall 16 defines a chamber 28 therein. Neck 24 communicates with body wall 16 via shoulder 26. Neck 24 has an

orifice 28 therein and a passageway 30 therethrough extending from orifice 28 to chamber 28.

As shown in Figures 6 and 7, lugs 32 and 34 extend from shoulder  
5 26 radially outward from neck 24 to adjacent the periphery of shoulder 26. Lugs 32 and 34 are situated generally oppositely about neck 24. Lugs 32 and 34 define flat surfaces 52 and 54 and angled surfaces 56 and 58, respectively. In lug 32, angled surface 56 slopes upward from shoulder 26 to intersect with flat surface 52, which extends generally directionally with  
10 the longitudinal extension of neck 24. In lug 34, angled surface 58 slopes upward from shoulder 26 to intersect with flat surface 54, which extends generally directionally with the longitudinal extension of neck 24. Lugs 32 and 34 take the general shape of a triangloid or a wedge.

15 Thread 36 extends from an upper portion of neck 24. Thread 36 has a pitch of about 0.08 to about 0.16 inch. Thread 36 has an initial full thread 60 and a terminal full thread 62 generally in alignment with flat surface 52 of lug 32 directional with the longitudinal extension of neck 24.

20 As shown in Figures 3 and 4, closure 12 has a top end 38 having a generally circumferential outer skirt 40 extending therefrom. Closure 12 also has a generally circumferential inner skirt 42 extending therefrom inside outer skirt 40. Inner skirt 42 has a thread 46 extending from its inner surface. Thread 36 of neck 24 can be screwed into thread 46 of inner skirt  
25 42. Outer skirt 40 terminates at a first edge 48 opposite top end 38. Inner skirt 42 terminates at a second edge 50 opposite top end 38. Outer skirt 40 has a slot 14 and another slot 15 oppositely situated thereabout that extend inwardly therein from first edge 48. Slot 14 has an angled edge 62 that angles and curves inward into outer skirt 40 and intersects a vertical edge  
30 64 that is generally directional with respect to the longitudinal extension of outer skirt 40. Slot 15 has an angled edge 66 that angles and curves inward into outer skirt 40 and intersects a vertical edge 68 that is generally directional with respect to the longitudinal extension of outer skirt 40. Slots 14 and 15 are adapted to receive an outer portion of each of lugs 32 and



34, respectively, when closure 12 is in locking position with head 22 as shown in Figures 1 and 8. Slots 14 and 15 slide over and/or around the outer portion of lugs 32 and 34 as closure 12 is screwed on container 20. In locking position, verticle edge 64 is generally in abutment with or  
5 adjacent to vertical surface 52 and vertical edge 68 of slot 15 is generally in abutment with or adjacent to vertical surface 54. Further in locking position, angled edge 62 is generally in abutment with or adjacent to angled surface 56 and a corresponding angled edge (not shown) of slot 15 is generally in abutment with or adjacent to angled surface 58.

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Closure 12 defines knurls 18 and 19 therein at the outer surface of outer skirt 40 extending from first edge 48 toward top end 38. Knurls 18 and 19 provide a gripping surface for the fingers (not shown) to squeeze, turn and remove closure 12 from container 20. When closure 12 is  
15 squeezed at knurls 18 and 19, the portions of outer skirt 40 having slots 14 and 15 therein are forced outward, thereby releasing lugs 32 and 34 from their locking position with slots 14 and 15.

An embodiment of a dispensing container is shown in Figure 12 and  
20 is generally referenced by the numeral 80. Closure 12 is shown in isolation in Figure 2. Container 80 has a body wall 88 and a head 82. Head 82 has a neck 84 and a shoulder 86. Body wall 88 defines a chamber 89 therein. Neck 84 communicates with body wall 88 via shoulder 86. Neck 84 has an orifice 94 therein and a passageway 98 therethrough extending from orifice  
25 94 to chamber 89.

As shown in Figures 13 to 16, lugs 90 and 92 radially extend from shoulder 86 from neck 84 to adjacent the periphery of shoulder 86. Lugs 90 and 92 are situated generally oppositely about neck 84. Lugs 90 and 92  
30 define flat surfaces 100 and 102, normal surfaces 104 and 106 and angled surfaces 108 and 110, respectively. In lug 90, angled surface 108 slopes upward from shoulder 86 to generally intersect with flat surface 100, which extends generally directionally with the longitudinal extension of neck 84. Normal surface 104 also extends generally directionally with the

longitudinal extension of neck 84 and is also generally perpendicular with respect to flat surface 108. In lug 92, angled surface 110 slopes upward from shoulder 86 to generally intersect with flat surface 102, which extends generally directionally with the longitudinal extension of neck 84. Normal  
5 surface 106 also extends generally directionally with the longitudinal extension of neck 84 and is also generally perpendicular with respect to flat surface 102. The relative configuration of flat surfaces 100 and 102 and normal surfaces 104 and 106 provides lugs 90 and 92 with a "notched" appearance.

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Thread 96 extends from an upper portion of neck 84. Thread 96 has a pitch of about 0.08 to about 0.16 inch. Thread 96 has an initial full thread 112 and a terminal full thread 114 generally in alignment with flat surface 100 of lug 90 directional with the longitudinal extension of neck 84.

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Closure 12 is engageable and lockable with container 80. Slots 14 and 15 of closure 12 are adapted to receive an outer portion of each of lugs 90 and 92, respectively, when closure 12 is in locking position with head 82. Slots 14 and 15 slide over and/or around the outer portion of lugs 90  
20 and 92 as closure 12 is screwed on container 80. In locking position, vertical edge 64 of closure 12 is generally in abutment with or adjacent to flat surface 100 and vertical edge 68 of slot 15 is generally in abutment with or adjacent to flat surface 102. Further in locking position, angled edge 62 is generally in abutment with or adjacent to angled surface 108 and a  
25 corresponding angled edge (not shown) of slot 15 is generally in abutment with or adjacent to angled surface 110.

Another embodiment of a dispensing container is shown in Figure 17 and is generally referenced by the numeral 130. Container 130 has a  
30 body wall 138 and a head 132. Head 132 has a neck 134 and a shoulder 136. Body wall 138 defines a chamber 139 therein. Neck 134 communicates with body wall 138 via shoulder 136. Neck 134 has an orifice 144 therein and a passageway 148 therethrough extending from orifice 144 to chamber 139.

As shown in Figures 18 to 20, lugs 140 and 142 radially extend from shoulder 136 adjacent the periphery of shoulder 136. Lugs 140 and 142 generally have the shape of a wedge and are isolated from and non-  
5 integral with neck 134. Lugs 140 and 142 are situated generally oppositely about neck 134. Lugs 140 and 142 define flat surfaces 150 and 152 and angled surfaces 154 and 156, respectively. In lug 140, angled surface 154 slopes upward from shoulder 136 to intersect with flat surface 150, which extends generally directionally with the longitudinal extension of neck 134.  
10 In lug 142, angled surface 156 slopes upward from shoulder 136 to intersect with flat surface 152, which extends generally directionally with the longitudinal extension of neck 134.

Thread 146 extends from an upper portion of neck 134. Thread 146  
15 has a pitch of about 0.08 to about 0.16 inch. Thread 146 has an initial full thread 158 and a terminal full thread 160 generally in alignment with flat surface 150 of lug 140 directional with the longitudinal extension of neck 134.

20 Closure 12 of Figure 2 is engageable and lockable with container 130. Slots 14 and 15 of closure 12 are adapted to receive an outer portion of each of lugs 140 and 142, respectively, when closure 12 is in locking position with head 132. Slots 14 and 15 slide over and/or around the outer portion of lugs 140 and 142 as closure 12 is screwed on container 130. In  
25 locking position, vertical edge 64 of closure 12 is generally in abutment with or adjacent to flat surface 150 and vertical edge 68 of slot 15 is generally in abutment with or adjacent to flat surface 152. Further in locking position, angled edge 62 is generally in abutment with or adjacent to angled surface 154 and a corresponding angled edge (not shown) of slot 15 is generally in  
30 abutment with or adjacent to angled surface 156.

As shown in Figures 10 and 11, there is a closure 170 having a top end 172 having a generally circumferential outer skirt 174 extending therefrom. Closure 170 also has a generally circumferential inner skirt 176

extending therefrom inside outer skirt 174. Inner skirt 176 has a thread 178 extending from its inner surface. The threads of any of the dispensing containers shown herein can be screwed into thread 178. Outer skirt 174 terminates at a first edge 180 opposite top end 172. Inner skirt 176

5 terminates at a second edge 182 opposite top end 172. Outer skirt 174 has a slot 184 and another slot 186 oppositely situated thereabout that extend inwardly therein from first edge 180. Slot 184 has an angled edge 188 that angles and curves inward into outer skirt 174 and intersects a vertical edge 192 that is generally directional with respect to the

10 longitudinal extension of outer skirt 174. Slot 186 has an angled edge 190 that angles and curves inward into outer skirt 174 and intersects a vertical edge 194 that is generally directional with respect to the longitudinal extension of outer skirt 174. Slots 184 and 186 are adapted to receive an outer portion of and lock with the lugs of any of the dispensing containers

15 shown herein. Slots 184 and 186 slide over and/or around the outer portion of such lugs. In locking position, vertical edges 192 and 194 are generally in abutment with or adjacent to the vertical surface of such lugs. Closure 170 has a plug seal 200 extending circumferentially from top end 172 generally directional to the longitudinal extension of closure 170. Plug

20 seal 200 is adapted to fit within and seal an orifice of a head of a dispensing container when closure 170 is in locking position therewith.

An embodiment of a dispensing container is shown in Figure 21 and is generally referenced by the numeral 210. Container 210 has a body

25 wall 218 and a head 212. Head 212 has a neck 214 and a shoulder 216. Body wall 218 defines a chamber 219 therein. Neck 214 communicates with body wall 218 via shoulder 216. Neck 214 has an orifice 224 therein and a passageway 228 therethrough extending from orifice 224 to chamber 219.

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As shown in Figures 21 to 23, lugs 220 and 222 radially extend from shoulder 216 from neck 214 to adjacent the periphery of shoulder 216. Lugs 220 and 222 are situated generally oppositely about neck 214. Lugs 220 and 222 define flat surfaces 230 and 232, knobs 234 and 236 and

inwardly tapered surfaces 238 and 240 and 242 and 244, respectively. The inwardly tapered surfaces at the outer portion of lugs 220 and 222 function to slow down the Flat surfaces 230 and 232 are generally planar in surface contour and extend from shoulder 216 generally directional with and generally radial to the extension of neck 214. A preferred height for lugs 220 and 222 is 0.1 inch as measured from shoulder 216 to the top of flat surfaces 230 and 222. Knobs 234 and 236 extend from shoulder 21 and lugs 220 and 222, respectively.

Dispensing tube 210 has a double-lead screw. In other words, there are two intermingling threads 225 and 226 that extend from and spirally traverse neck 214. The threads have a pitch of about 0.15 to about 0.3 inch and preferably about 0.2 inch. Thread 225 has an initial full thread 233 and a terminal full thread 231. Thread 226 has an initial full thread 234 and a terminal full thread 232. An important feature of the invention is that initial full threads 233 and 234 are generally in alignment with lugs 220 and 222 directional with the longitudinal extension of neck 214. Although terminal full threads 231 and 232 are also generally in alignment with lugs 220 and 222 directional with the longitudinal extension of neck 214, this is not important to the present invention. Other possible dispensing tube embodiments could have multiple-lead screws, such as triple-lead, quadruple lead, and the like.

Dispensing tube 210 is mated with closure 246 to form dispensing tube package 248, which is shown in Figures 22 and 23. Closure 246 is engageable and lockable with dispensing containers of the present invention, including container 210. As shown in Figures 23 to 25, closure 246 has oppositely situated slots 250 and 252, which are adapted to receive an outer portion of each of lugs 220 and 222, respectively, when closure 246 is in locking position with head 212. Slots 250 and 252 slide over and/or around the inwardly tapered surfaces of the outer portion of lugs 220 and 222 as closure 246 is screwed on container 210. The inwardly tapered surfaces at the outer portion of lugs 220 and 222 function to slow down the rotation speed of closure 246 such that lugs 220 and 222

will snap into slots 250 and 252. The outer portions of lugs 220 and 222 protrude through slots 250 and 252 when closure 246 is in locking position with head 212. Slots 220 and 222 define oppositely situated vertical edges 254 and 256 (not shown) at their leading edges. When in locking position,

5 vertical edge 254 of closure 246 is generally in abutment with or adjacent to flat surface 230 and vertical edge 256 of slot 222 is generally in abutment with or adjacent to flat surface 232. Closure 246 has knurles 258 and 260 to aid in squeezing, turning, and removal of same. Knobs 234 and 236 provide a support surface against which the inside surface (not shown) of

10 closure 246 may rest. Apart from the aforementioned recited structure, closure 246 has additional structure corresponding to the other disclosed closure embodiments herein, including, but not limited to inner and outer skirts, mating threads, plug seals, and the like.

15 The package, including dispensing container and closure, may be produced by any method known in the art such as extrusion or lamination. In extrusion, plastic tubes are extruded continuously then cut into discrete lengths to form tubular body walls for the inner and outer containers. Tubes of different diameters are used the inner and outer containers.

20 Heads are then heat welded or adhered to the tube lengths of both diameters to form the inner and outer containers. The inner container is inserted into the open end of the outer container and attached to or inserted into the head and/or neck of outer container. A closure, cap or top is applied to the head of the outer container. The open ends of inner and

25 outer containers are typically filled with functional and/or decorative products to be dispensed and then sealed by heat or mechanical means. Overlapping the ends and heat sealing is preferred. In lamination, sheets of plastic material are rolled into tubes and sealed along the sheet edges to form continuous tubes. The continuous tubes are cut into discrete tube

30 lengths and further processed in the same manner as when forming extruded dispensing containers.

The closure and head may be manufactured according to any method known in the art such as injection molding, compression molding or stamping with a plastic material. Injection molding is preferred.

5           The package may be manufactured from any plastic material known in the art. Representative plastic materials include ethylene polymers, propylene polymers, polyesters, and polyamides. Useful ethylene polymers include low density polyethylene, medium density polyethylene, high density polyethylene and linear low density polyethylene. A useful  
10       propylene polymer is polypropylene. Useful polyesters include polyethylene terephthalate. Preferred plastic materials are low density polyethylene and polypropylene. Different parts of the package may be manufactured from the same or different materials. A preferred plastic  
15       material for tube body walls is low density polyethylene. Preferred plastic materials for the head and the closure are high density polyethylene and polypropylene.

          It should be understood that the foregoing description is only illustrative of the present invention. Various alternatives and modifications  
20       can be devised by those skilled in the art without departing from the invention. Accordingly, the present invention is intended to embrace all such alternatives, modifications and variances which fall within the scope of the appended claims.

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